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December 17, 2019

Diane Salkie
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290 Broadway, 20th Floor
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Re: New Jersey Department of Environment of Protection (NJDEP) CSTAG/NRRB Stakeholder Letter (dated November 14, 2019) and November 20 Stakeholder Presentation - Lower Passaic River Study (LPRSA), Diamond Alkali Superfund Site, Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study CERCLA Docket No. 02-2007-2009

Dear Ms. Salkie and Mr. Sivak:

The LPRSA Cooperating Parties Group (CPG) writes to the United States Environmental Protection Agency (USEPA) to address and respond to a number of assertions including (1) "tenets" and/or stipulations that NJDEP mischaracterizes as being agreed upon by both USEPA and NJDEP and (2) technical comments related to the Upper 9-Mile Interim Remedy (IR) made by the NJDEP representatives in both their November 14 Letter and November 20 presentation to the Contaminated Sediment Technical Assistance Group (CSTAG) and the National Remedy Review Board (NRRB) that do not accurately reflect the actual agreements and understandings that have been reached by USEPA, NJDEP and the CPG or the status of matters that are still subject to ongoing discussions.

In providing responses to NJDEP's assertions, the CPG has relied on both USEPA's October 10, 2018 Direction Letter (hereafter Direction Letter) and December 14, 2018 Letter establishing Remedial Action Objectives (hereafter RAO Letter) for the IR on whether agreement has been reached on the NJDEP's tenets.

CPG RESPONSE TO NJDEP'S TENETS FOR THE UPPER 9-MILE INTERIM REMEDY NJDEP ASSERTION (Page 2)

The NJDEP states in its November 14 letter a number of tenets on which it bases its support for an IR for the Upper 9-miles of the LPRSA. Based on our conversations with USEPA as well as our participation in FS meetings since October 2018, the CPG believes that NJDEP has mischaracterized some of these tenets as having been agreed upon by the USEPA.

"In October 2018, after a long negotiation period by the working parties, and with the support of specific recommendations by CSTAG issued in April 2018, the NJDEP gave support to the USEPA to move forward with the OU4 Project transitioning from a traditional CERCLA RIFS process, to an Interim Remedy project with specific agreed-upon conditions by EPA Region 2. These tenets stem

from the Department's firm resolve that, to the extent feasible, this interim remedial action to be embodied in ROD 1 *should be sufficiently designed to definitively meet the project RAOs (December 2018) to best support this action being the only in river action needed for follow-on Monitor Natural Recovery (MNR) to reach future risk-based goals in a reasonably-acceptable timeframe, i.e., approximately 10 years, post ROD 1 implementation and success prove-out.* Given the current project schedule for IR design and construction ending at approximately 2028, this means attaining risk-based goals in the upper 9 miles of the river by 2038 or soon thereafter. The Department's agreed-upon tenets to support this objective are as follows:

- [Tenet 1] That the requirements and work products of the current RI/FS remain open and active (primarily referring to PRG development), with the original schedule to be maintained to the extent possible; these actions will still need to be met through a future final ROD;
- [Tenet 2] A goal of the Interim Remedial Action will be to achieve a post-remedy SWAC of either 65 ppt, 75 ppt or 85 ppt from river mile 8.3-15; the alternatives developed and evaluated in the feasibility study will represent these three post-remedy SWAC goals;
- [Tenet 3] By reducing the total PCB SWAC from river mile 8.3 to river mile 15 to below established background concentrations, reported as 460 ug/kg, or 0.46 ppm;
- [Tenet 4] The post-remedy SWAC will be achieved on Day 1 post-Interim Action Remedy, meaning, demonstrated soon after construction completion and not met through evaluation of future deposition of clean sediment;
- [Tenet 5] The feasibility study will consider alternatives which include dredging to clean sediments where feasible to lessen the need for capping, and its associated institutional controls and long-term O&M in these areas.
- [Tenet 6] As part of the feasibility study, the method to be used for demonstrating attainment of Interim Remedy Remedial Action Objectives and the post-remedy SWACs for total PCBs and 2,3,7,8-TCDD will be discussed; the principles for implementation will be developed and agreed upon by USEPA and NJDEP and reflected in the feasibility study, Proposed Plan, and ROD." *(emphasis removed; tenet numbers added for referencing below)*

CPG Response - While some of NJDEP's tenets have been discussed and agreed upon by USEPA, NJDEP and the CPG, the NJDEP in some instances has mischaracterized that these tenets and related assertions have been agreed to by all three parties or, between USEPA and NJDEP. The CPG relies on the USEPA's Direction, RAO Letters and USEPA comments at FS meetings to determine whether agreement has been reached on the NJDEP's tenets and assertions.

- The assertion that risk-based goals must be attained approximately 10 years after completion of the source control IR was not discussed in the USEPA's Direction Letter nor has USEPA stated such goals at the FS meetings. Rather, the discussions at the FS meetings, as you are well aware, have suggested that it may require at least 5-7 years after the initiation of Long-term Monitoring before it is possible to (1) identify trends that indicate recovery is occurring and whether risk-based levels will be met in reasonable timeframe or (2) identify the need for additional actions. Combined with the likelihood that it may take 2-3 years to determine IR Completion (discussed below), it will likely be, at minimum, 7-10 years after construction completion of the IR before a decision can be made by USEPA as to whether the Final ROD will document that MNR will attain final risk-based goals or whether additional actions are required.

- The first tenet was not discussed in the USEPA's Direction Letter. Although, there has been some discussion on the ultimate conclusion, there has been no agreement that the 17-

mile RI/FS AOC will remain open indefinitely for the purpose of PRG development. USEPA has stated that development of initial PRGs will occur following ROD 1 and developed in parallel to the remedial design for the source control IR. The CPG has accepted the USEPA's position on the timing for initial PRG development and the CPG has suggested that this can be incorporated into a new AOC for the Source Control IR Remedial Design.

- The second tenet is consistent with USEPA's Direction Letter and the CPG concurs that the three parties agreed to evaluate the three remedial alternatives in the IR Feasibility Study (FS) which include a post-remedy SWAC of either 65 ppt, 75 ppt or 85 ppt 2,3,7,8-TCDD in river mile 8.3-15 and the draft IR FS reflects this agreement.

- This third tenet is consistent with the USEPA's RAO Letter and the CPG concurs that the three parties agreed to a goal of reducing the total PCB SWAC from river mile 8.3 to river mile 15 to below established background concentrations, reported as 460 ug/kg or 0.46 ppm, and RAO 1 documents this goal.

- This fourth tenet is not supported by either the USEPA's Direction or RAO Letters or by the discussions we have had at the FS meetings. There is no agreement that the post-remedy SWAC will be achieved on "Day 1" post-Interim Action Remedy, meaning, demonstrated soon after construction completion and not met through evaluation of future deposition of clean sediment.

  In fact, the extensive discussions throughout late 2018 and 2019 have determined that the first sediment sampling event to determine IR Completion is likely to occur several months after completion of construction, followed by an evaluation of the sediment data to determine whether (1) there is a high likelihood that the 2,3,7,8-TCDD SWAC goal of 85 ppt (i.e., Y*85) has been met and (2) that no actionable sources above the remedial action limit (RAL) remain. If these two metrics have not been achieved, then a second post-IR sediment sampling event and subsequent additional evaluation(s) of these two metrics will occur to determine IR Completion. Realistically, this process will require as much as 2-3 years before a determination can be made that the source control IR is complete.

- The fifth tenet is based on the USEPA's Direction Letter; however, all parties agreed that there are insufficient data available to include an evaluation of "dredge to clean" in the IR FS. Moreover, it was agreed that the IR FS would retain "dredge to clean" as a remedial process option that will be considered during the remedial design based on the PDI data, which will allow a fulsome evaluation of the need and practicality of "dredging to clean" in some areas of the remedial footprint.

  Nonetheless, the primary goal of the IR is source control as reflected in the first sentence of RAO 1: "*Control the sediment sources of 2,3,7,8-tetrachlorodibenzodioxin (TCDD) and total polychlorinated biphenyls (PCBs) by remediating surface sediment source areas containing elevated concentrations, thereby reducing the surface weighted average concentrations (SWACs) of 2,3,7,8-TCDD and total PCBs from river mile (RM) 8.3 to RM 15*". In addition, RAO 2 addresses subsurface sources above the subsurface RAL that might be exposed due to erosion. An evaluation of "dredge to clean" must necessarily be constrained by the requirements of RAO 2, and thus subsurface sediments are not to be remediated if their concentrations are lower than the subsurface RALs and/or are not subject to erosion. It follows that "dredging to clean" for the purpose of remediating subsurface sediment that will not be remediated to meet RAO 2 is beyond the scope and intent of the source control IR.

- The sixth and final NJDEP "tenet" is consistent with the USEPA's Direction Letter and the CPG concurs that all parties have agreed to develop an IR Completion process. The Draft FS Appendix H outlines an IR Completion process that largely follows USEPA's July 24, 2019 narrative. Further, all parties are continuing the discussions on how to best determine IR Completion. Additional responses by the CPG on the NJDEP's subsequent assertions regarding IR Completion are addressed later in this letter.

CPG RESPONSE TO NJDEP'S ASSERTION THAT LARGER ALTERNATIVES ACHIEVE GREATER SOURCE CONTROL AND EARLIER ATTAINMENT OF RISK-BASED TARGETS

NJDEP Assertion (Page 5 a.1.) - "Within the comparative analysis of the alternatives (8.4.2 Primary Balancing Criteria) modeled outcomes for the 10 years following completion under alternatives 2, 3, and 4 are compared and it is asserted that "the degree of SWAC reduction at the completion of construction does not result in appreciably lower SWACs in the 10 years following construction (Figure 8-5)." The Department considers this conclusion inaccurate. As reported in FS Table 7-1, these three alternatives are expected to achieve respective SWACs of 80, 70, and 60 ppt 2,3,7,8-TCDD. The alternatives that set lower targets would achieve lower SWACs as intended. As reported in the same paragraph, Figure 8-6 shows comparable rates of recovery for these three alternatives in the l0 years following construction. This indicates that the successively **greater post-construction source control** achieved by alternatives 3 and 4, relative to alternative 2, would persist through the first 10 years after construction, resulting in lower SWACs at the end of the period, and earlier achievement of risk-based targets under subsequent natural recovery." *(emphasis as quoted)*

CPG Response - The NJDEP's assertion that the lower SWAC targets of the larger alternatives achieve greater post-construction source control that would result in earlier achievement of risk-based targets under subsequent natural recovery is unsupported by the additional information on sediment source characteristics and source control metrics that CPG presented in its November 12 statement and November 20 presentation to CSTAG/NRRB.

The NJDEP has incorrectly conflated SWAC reduction and source control. Its inference that incremental differences in SWAC reduction (either immediately upon remedy completion or 10 years following construction) indicate meaningful differences in source control effectiveness is logically flawed, given that (1) attainment of any particular SWAC target does not define a bright line for the control of the internal sediment sources that are impeding recovery of the river and (2) incrementally larger SWAC reductions thus do not correspond to greater control of those sources.

NJDEP, USEPA Region 2 and the CPG agree that source control is achieved by remediating fine sediments. In its statement to CSTAG, NJDEP stated that the key features of a final remedy are "... hot spot removal and capping of problematic highly impacted silt beds, followed by MNR to reach risk-based goals." The extent of the remedy USEPA selected for the lower 8 miles is based in large measure on the conclusion that the fine-grained sediments are the important contaminant sources (ROD; USEPA 2016[1]).

Surface sediments with 2,3,7,8-TCDD concentration above 346 ng/kg (the Remedial Action Level [RAL] for Alternative 5[2]) average 60% silt/clay sized particles. Between 346 ng/kg and 260 ng/kg

[1] USEPA (U.S. Environmental Protection Agency), 2016. Record Of Decision. Lower 8.3 Miles of the Lower Passaic River Part of the Diamond Alkali Superfund Site Essex and Hudson Counties, New Jersey. USEPA, Region II. March 6, 2016.

[2] The RALs for the Alternatives are derived from the base COPC mapping used in the FS.

lie the additional sediments targeted by Alternative 2 and samples in this range have on average 58% silt/clay. These percentages are characteristic of fine sediments. The samples from confirmed fine sediment deposits of the Upper 9 miles contain, on average, 58% silt and clay sized particles.

Sediments with concentrations less than 260 ng/kg have lower silt/clay content indicating they are of a coarser nature. The additional sediments targeted by Alterative 3, which lie between 260 ng/kg and 205 ng/kg, average 39% silt/clay. The still lower concentration sediments that would be targeted by Alternative 4 (i.e., between 205 ng/kg and 164 ng/kg) average 33% silt/clay. Thus, Alternatives 3 and 4 extend targeting to sediments that are progressively less likely to be significant sources, by virtue of their lower fine sediment content and lower contaminant concentrations.

The model projections of source strength affirm that targeting the lower concentration, coarser sediments achieve little additional source control. Using the average gross flux of 2,3,7,8-TCDD from sediments over a 10-year post remedy period as a measure of source, it is evident that even the smallest of the active remedy alternatives (Alternative 5) achieves substantial source control (Figure 3a of CPG's statement to CSTAG/NRRB[3], which is attached to this letter as Attachment 1). Its 2,3,7,8-TCDD resuspension flux of 2.5 grams per year (g/y) is five-fold (78%) lower than the flux that would be realized under No Further Action (NFA: Alternative 1), which is predicted to contribute approximately 12 g/y to the water column[4]. Reducing the RAL by 25% to 260 ng/kg in Alternative 2 reduces the flux by an additional 1.5% (0.19 g/y). Further reductions of the RAL have a progressively smaller impact reflecting a declining influence of lower concentration sediments on the aggregate sediment source; a RAL of 205 ng/kg (Alternative 3) reduces the flux by another 1% (0.12 g/y) and a RAL of 164 ng/kg (Alternative 4) further reduces the flux by only 0.2% (0.02 g/y). The relative reduction of the sediment source strength is in each case considerably smaller than the relative SWAC reduction.

The reduction in depositing particle 2,3,7,8-TCDD concentration on fine sediments[5], which controls post-remedy recovery, mirrors the reduction in gross flux. Relative to the NFA scenario (Alternative 1), all active IR alternatives are projected to achieve, on average, more than a 70% reduction in the depositing 2,3,7,8-TCDD concentrations (Figure 3b of CPG's statement to CSTAG/NRRB[3], which is attached to this letter as Attachment 1). This reduction varies marginally among the alternatives; it is about 73% (86 ng/kg) for Alternative 5 and Alternatives 2, 3, and 4 incrementally reduce the concentration further by 1.8%, 1.1%, and 0.2%, respectively, as lower concentration sediments are targeted. Source control is achieved by Alternative 5 and further reductions in the RAL yield marginal benefit in reducing the 2,3,7,8-TCDD concentrations on depositing fine sediments.

Because the concentrations on the depositing particles that control recovery differ little among the alternatives, the differences in SWACs among the alternatives will likely decline over time. Therefore, it is not clear that the small residual differences in projected SWAC 10 years following construction support a conclusion that larger alternatives would achieve risk-based targets materially earlier than the smaller alternatives.

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[3] CPG NRRB/CSTAG Statement, Upper 9 Mile Interim Remedy and Adaptive Management. November 12, 2019.

[4] Note that the reduction in flux in the post-remedy period in the 10-year post-remedy period is less than the initial SWAC reduction achieved because there is recovery of the system during that period under Alternative 1, albeit a slow one.

[5] The average depositing particle concentration is here estimated for each alternative as the ratio of the total chemical deposition flux to the total fine (cohesive) sediment deposition flux over the 10-year post-remedy.

CPG RESPONSE TO NJDEP'S ASSERTION THAT "POTENTIAL LIKELIHOOD OF EXCEEDING RAO 1" SHOULD BE ADDED AS A CRITERION IN THE COMPARATIVE ANALYSIS OF ALTERNATIVES

NJDEP Assertion (Page 6 a.2.) – "Similarly, given inherent limitations on how well existing models are able to simulate actual river conditions, along with known and anticipated variability in sediment data, the Department is advocating for consideration of a criterion addressing "potential likelihood of exceeding RAO I". Although the FS identifies that all selectable alternatives (Alternative 2 - 4) have the possibility of meeting the RAO goals, varying probabilities of exceeding RAO 1 are present. Alternative 4 is considered least likely to exceed RAO 1, whereas, Alternative 2 has a higher likelihood of exceeding RAO I over Alternatives 3 and 4. The Department's recommendation is that this difference among alternatives is accounted for within criterion 5, Short-Term Effectiveness."

CPG Response - NJDEP is advocating "potential likelihood of exceeding RAO 1" as a factor in Short-Term Effectiveness with Alternative 2 having the highest likelihood and Alternative 4 the lowest likelihood. The notion that Alternative 4 will have a lower potential to exceed 85 ppt than Alternative 2 seems to rely on the model projections, which show impacts of the assumed 3% resuspension and targeting errors that are likely overstated (due to the sparsity of the available data used for contaminant mapping and because FS-level delineations do not account for confirmatory infill sampling). Those results highlight the need for careful design and implementation but are not predictors of the outcome of such care. For example, projections yield for Alternative 3 predicted concentrations at the end of the Interim Remedy ranging widely from 162 ng/kg (3% dredge resuspension with capping bed properties not represented) to 70 ng/kg (1% dredge resuspension with capping bed properties represented), but this difference decays to a much narrower range of 66 ng/kg to 42 ng/kg 10 years post-remedy.[6] It is a misuse of the model findings to conclude that Alternative 4 is a superior choice because it over-designs to hit the 85 ppt objective. No change to the criteria considered in the comparative analysis of alternatives is supported under this vague and subjective appeal to the precautionary principle.

The best predictors of what is likely are the experiences at other sites. That experience shows that well designed and implemented remediation does achieve its objectives. NJDEP's implicit assumption that a remedy designed to achieve 85 ppt would have a reasonable likelihood of not achieving 85 ppt is unsupported and in direct conflict with real-world evidence. OU1 of the Fox River had a pre-remedy PCB average of 3.7 mg/kg and a SWAC goal of 0.25 mg/kg. Post-remedy sampling indicated that this goal was achieved. The post-remedy SWAC was 0.23 mg/kg (Wisconsin Department of Natural Resources 2011[7]). Post-remedy surface sediment sampling on the Hudson River showed that remediation successfully addressed sediments that met the RAL. Greater than 99% of the post-remedy samples were below the RAL. Moreover, the natural recovery areas showed no evidence of resuspension impacts and had average post-remedy concentrations below average pre-remedy concentrations. In the area of the river with the most extensive remediation, the pre-remedy average PCB concentration in natural recovery areas was 8 mg/kg; post remedy, the average was 3 mg/kg.

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[6] In-progress simulations will allow for a characterization of the influence of the assumed resuspension rate across all alternatives.

[7] Wisconsin Department of Natural Resources, 2011. Lower Fox River Operable Unit 1 Post-Remediation, Executive Summary By the Agencies/Oversight Team. March 29, 2011.

CPG RESPONSE TO NJDEP'S ASSERTION THAT THE SUBSURFACE 2,3,7,8-TCDD RAL UNDER RAO 2 SHOULD BE THE SAME AS THE SURFACE RAL UNDER RAO 1

NJDEP Assertion (Page 10) - "Third, it is noted that Appendix H identifies RAO 2 sediments targeted for remediation as subsurface sediment areas (6 inches to 1.5 ft.) outside of the RAO 1 footprint which are vulnerable to erosion and have 2,3,7,8-TCDD concentrations **at or above 2 times the RAL established to achieve the surface SWACs for RAO 1**, and/or have PCB concentrations of 2 ppm (2 times the established RAO 2 RAL for PCBs of 1 ppm). In other words, problematic sediment that could impede river recovery that are not already addressed by RAO I.

While the Department accepts the proposal for PCBs, the Department cautions against the above approach for 2,3,7,8-TCDD given the often-unpredictable shifting of erosional and depositional areas of the river (as described under RI observations above) and the existing very high magnitude of dioxin concentrations in these areas relative to background and expected future risk-acceptable goals. If the surface RAL is 250 ppt, use of a subsurface RAL for dioxin of 2 or higher would equate to allowing up to 500 ppt or more of this contaminant to reside within just 6 inches of the sediment bed surface without any other controls. These areas pose a standing threat to river recovery and should be addressed in a more protective fashion. The Department advocates for use of similar 2,3,7,8-TCDD RALs for both RAO 1 and RAO 2 as this would further support attainment of project RAO I SWACs and better safeguard a timelier recovery to risk-acceptable conditions, because these additional sources are addressed in a more protective fashion. However, the order of operations for remedial footprint designation, with RAO 1 applied first, followed by RAO 2, must be maintained." *(emphasis as quoted)*

CPG Response - NJDEP has ignored the analyses that provide the rationale for the 2x multiplier. That rationale and the decision to establish the 2,3,7,8-TCDD subsurface RAL as 2x the surface RAL was discussed in FS technical meetings held among USEPA Region 2, the NJDEP, and the CPG and is documented in meeting minutes approved by all parties (see FS Appendix I). In summary, the multiplier reflects the finding that there is about a 25% chance that a location vulnerable to erosion would experience further erosion exposing sediments more than 15 cm below the sediment surface.

The NJDEP argues against the multiplier by asserting there is considerable uncertainty in identifying whether a location is vulnerable to erosion because of "often-unpredictable shifting of erosional and depositional areas of the river." NJDEP has inaccurately characterized our understanding of erosion and deposition. Knowledge of river hydrodynamics, geomorphology and sediment transport provides a basis to identify areas vulnerable to erosion. Bathymetric differencing of multibeam surfaces provides empirical evidence of where erosion of 3 inches or more has occurred. The utility of bathymetric changes to identify areas subject erosion underlies USEPA's directive to collect such data, which resulted in a bank-to-bank bathymetry survey in 2019. The combination of a fundamental scientific understanding of erosion and deposition and the findings from bathymetric differencing provide a strong basis to identify areas vulnerable to erosion.

Any residual uncertainty in vulnerability to erosion is not addressed by the subsurface RAL. Sediments that may be incorrectly classified as invulnerable to erosion during remedial design will not be subject to RAO 2, and are not compensated for by a lower subsurface RAL applied elsewhere. Remediation of lower concentration sub-surface sediment does not mitigate against erosion of higher concentration subsurface sediments at misclassified locations. The best means

to mitigate such erosion is careful consideration of erosion and deposition in the manner discussed above.

A further argument for the 2x multiplier is that the surface RAL will be characteristic of the concentrations on recently deposited sediment. Because recently deposited sediments are not source sediments, it is an overly conservative choice for a subsurface RAL. The objective of RAO 2 is to address subsurface sediments at concentrations representative of the more contaminated legacy sediments that may act as material sources if exposed; dropping the subsurface RAL to the surface RAL runs counter to this objective and adds little to the aggregate source control of the remedies.

CPG RESPONSE TO NJDEP'S ASSERTION THAT THE ESTIMATED POST-IR SWAC MUST BE LESS THAN THE SWAC GOAL

NJDEP Assertion (Page 11) - "... it is important to the Department that the SWAC goal is attained with the majority of the distribution less than 85 ppt for 2,3,7,8-TCDD and less than 0.46 ppm for PCBs, as was initially conceived during our October 2018 agreements at the outset of the IR path."

CPG Response - The NJDEP is advocating that the 2,3,7,8-TCDD SWAC calculated from post-remedy sampling must be less than 85 ng/kg and the calculated PCB SWAC must be less than 0.46 mg/kg to conclude the remedy is complete. Such requirements are inconsistent with the USEPA position that the statistical analysis of post-remedy data need account for "the possibility that SWACs could exceed the RAO 1 concentration thresholds while still having successfully addressed sediment sources through the IR." (USEPA July 24, 2019). USEPA has recognized that SWACs estimated from post-remedy sampling data would be subject to considerable uncertainty such that sample SWACs estimates greater than the RAO 1 goals are likely even if the true SWACs are at or below the goals.

The inability to precisely define the post-remedy SWACs that will be attained by the IR derives from the considerable uncertainty in the distribution of concentrations in the river sediments. The significant shortcomings of attempting to define the post-remedy SWACs are illustrated by USEPA's recently presented analysis indicating that as many as 2,400 locations may have to be sampled to achieve a high probability of declaring success when the SWAC goal is achieved and an appropriately high probability of declaring failure when the true post-IR mean is greater than Y times the SWAC (Slide 13 of USEPA September 16, 2019 presentation to NJDEP). That would be a sampling density of almost 10 locations per acre, which exceeds even the high density sampling contemplated for designing the remedy.

Simulations conducted by USEPA have shown that a sampling program targeting as many as 400 locations will yield 2,3,7,8-TCDD SWAC estimates whose uncertainty can be as high as the estimate itself (e.g., a SWAC estimate of 80 ng/kg might have an uncertainty interval that stretches from 40 ng/kg to 120 ng/kg).[8] This wide band of uncertainty precludes or prevents judging whether the SWAC goals have been achieved, and there is a high likelihood that there will be false conclusions about whether or not the SWAC goal was achieved.

Requiring that the post-IR sample SWACs be less than 85 ng/kg for 2,3,7,8-TCDD and 0.46 mg/kg for PCBs makes it much more likely that the highly uncertain results of post-remedy sampling would trigger studies to identify areas for additional remediation. The public perception would be that

[8] Inferred from Slide 5 of the USEPA Region 2 July 10, 2019 presentation at an FS meeting attended by USEPA Region 2, NJDEP and the CPG held at USEPA Region 2 Office in Edison, NJ.

the remedy failed, even though there may be a reasonable probability that the SWAC goals had been met.
The NJDEP position reflects its discomfort with the uncertainty inherent in a post-remedy SWAC estimate and desire for conservatism in the face of this uncertainty. The unfortunate result of such conservatism is a high likelihood of falsely concluding that goals were not achieved and the negative consequences that result.

A 2,3,7,8-TCDD SWAC of 85 ng/kg is arbitrary as a bright line for exposure reduction or source control. It does not establish a goal that provides any basis for determining whether ongoing recovery will ultimately attain final remedial goals or whether additional actions are required. The SWACs defined for source control in RAO 1 are not absolute thresholds for source control nor are they thresholds needed to achieve accelerated longer-term recovery. A post IR SWAC cannot definitively be established with post IR sediment sampling and is not a reliable or sound metric to measure IR completion.

To get beyond the uncertainty of post-remedy SWACs and NJDEP's default to conservatism in the face of that uncertainty, the CPG believes that a RAL is a superior and measurable metric that should be used to assess remedy completion:

- A RAL is directly tied to attaining source control and can be set based on PDI data and system understanding.
- Targeting a RAL based on the PDI data ensures source control and increases the likelihood of a successful source control IR.
- Achievement of a RAL at the completion of the source control IR can be confirmed with a higher degree of certainty than a SWAC.

USEPA should consider revising RAO 1 to express the post-IR SWAC goals as follows: remediate sediments above RALs established to achieve a post-remedy 2,3,7,8-TCDD SWAC from RM 8.3 to RM 15 of not more than 85 ng/kg, and to achieve a post- remedy total PCB SWAC from RM 8.3 to RM 15 that is at or below the established total PCB background concentration of 0.46 mg/kg.

CPG RESPONSE TO NJDEP'S ASSERTION THAT THE ADAPTIVE MANAGEMENT PLAN SHOULD BE RESTRUCTURED BASED ON PROJECT PHASES

NJDEP Assertion (Page 7) - The NJDEP's statements challenge the structure of the draft Adaptive Management Plan (AMP) submitted by the CPG to Region 2 as Appendix D to the draft IR FS on September 25, 2019, asserting that instead of the proposed organization based on three primary Adaptive Elements, "there is increased value in analyzing AM opportunities within each remedial phase" i.e., as part of "IR ROD 1 Design", "IR ROD 1 Implementation", and "Post ROD Recovery Monitoring to achieve PRGs".

CPG Response – The CPG presented a clear rationale in the AMP for structuring the adaptive management process for the upper 9 miles of the LPR around three primary Adaptive Elements:

- Development of PRGs and Final RGs
- Overall System Response
- Recovery Assessment to Attain PRGs/RGs.

In summary, these adaptive elements were developed to identify key project activities that will be associated with well-defined decision points and may trigger an adaptive response during or following the IR. As such, each element addresses a primary decision question that is grounded in a testable hypothesis related to the behavior of the system and its expected response to

remediation. In this regard, the approach to structuring AMP is consistent with established principles of adaptive management.[9,10] Further, the draft AMP provides explicit linkages between each adaptive element, project phases, and the uncertainties that will be evaluated and addressed during each (see draft AMP Figure 2-2), which should address NJDEP's overall concern. The CPG sees no basis for restructuring the AMP in response to the NJDEP's preferences.

CPG RESPONSE TO NJDEP'S ASSERTIONS REGARDING PRG DEVELOPMENT

NJDEP Assertions (Page 7) – The NJDEP contends that "existing uncertainties hindering development of PRGs can be identified and addressed within the design phase," concluding that "because PRG development is always done through a careful evaluation of site-specific conditions, unless new and significantly different information comes to light, PRGs are not expected to undergo revision once established." Further the NJDEP objects to the CPG's proposal within the draft AMP to develop ranges of working PRGs (prior to developing final RGs as point values), stating that "[t]he additional confusion that a range of PRGs will introduce to this already complex project is considered unproductive to remedial progress."

CPG Response – NJDEPs assertions regarding the confidence that can be placed in initial PRG development, which will occur in parallel with remedial design, proceed from a false premise regarding the sources and degree of uncertainties that are likely to remain at the time the initial PRGs are developed. These uncertainties relate to the structure of the food web; the relationships that will exist among surface sediment, water column, and fish and crab tissue concentrations following the implementation of the IR; and spatial and temporal variations in these relationships. (A summary of the key uncertainties is presented in Table 3-2 of the draft AMP, which is attached to this letter as Attachment 2). While many of the uncertainties will be better constrained through further data collection and model refinement prior to developing the initial PRGs, the CPG anticipates that significant uncertainties will remain – particularly with respect to post-IR recovery rates of sediment, water, and tissue and potential changes to food web structure in response to remediation of the LPR. For that reason, the Adaptive Management Plan establishes a framework for the progressive refinement of PRGs prior to establishing final remedial goals in a second ROD. The approach described in the Plan emphasizes prioritizing data collection during remedy implementation and post-IR monitoring on efforts that will have the greatest effect on reducing uncertainty in the initial PRGs and ultimately final RGs, providing greater assurance that the final remedy will be protective. In contrast, the NJDEP's assertion that "PRGs are not expected to undergo revision once established" is counter to adaptive management principles and EPA guidance on the progressive development of PRGs until final RGs are established in a ROD.

The CPG has already responded in writing to the concerns raised by Region 2 in its October 18, 2019 comments on the draft IR FS about expressing initial PRGs as ranges. In summary, the CPG has offered to modify the approach for characterizing the uncertainty in initial PRGs that will be developed concurrently with the remedial design phase of the project, focusing on assessing the uncertainty in the variables used in the initial PRG calculations. Key variables that have the greatest influence on the derivation of the initial PRGs will be identified, and the sensitivity of the initial PRGs to the uncertainty in these variables will be evaluated. As stated above, this

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[9] DOI. 2009. Adaptive management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group. U.S. Department of the Interior.

[10] NAS. 2004. Adaptive management for water resources project planning. Panel on Adaptive Management for Resource Stewardship. National Research Council of the National Academy of Sciences. Washington, DC.

information will be used to prioritize data collection and other efforts during IR implementation and post-IR monitoring.

CPG RESPONSE TO NJDEP'S ASSERTION THAT ALTERNATIVE 2 SHOULD NOT BE SELECTED

NJDEP Overall Conclusion (Pages 11-12) – "Given the uncertainties and other concerns identified in our comments above on the IR FS, at this time, the Department cannot agree with the selection of Alternative 2, design target of 85 ppt. Modeling performed for the FS indicated that remedies designed to meet SWAC targets of 65 and 75 ppt achieved lower SWACs post-remedy, as intended, and that simulated SWACs representative of 10 years of post-dredging recovery were lower for the lower target SWACs. Thus, achievement of ultimate risk-based remedial goals would happen sooner if the SWAC target were lower than 85 ppt. These differences in outcome should be weighed against other balancing criteria; however, they are not currently considered in the draft FS. Uncertainties in implementation of the remedy should also be considered in the selection of a target SWAC, including the extent of potential recontamination of un-remediated and capped areas from activity in the upper 9 and lower 8 miles. Another key uncertainty is the possibility of accepting a remedy that has not actually achieved the SWAC target: this risk cannot be eliminated, given the unavoidable variability of a post-remedial SWAC estimate, but can be reduced by choosing a lower target SWAC." *(emphasis added)*

CPG Response - The NJDEP asserts that uncertainties in implementation of the remedy should be considered in selection of a target SWAC, including the extent of potential recontamination of un-remediated and capped areas from activity in the upper 9 and lower 8 miles. It is arguing for application of the precautionary principal, which is inconsistent with an IR that incorporates Adaptive Management. The objective of Adaptive Management is to make informed decisions based on current understanding and adapt as necessary based on new knowledge. It is inconsistent with Adaptive Management to default to arbitrary conservatism because knowledge gaps exist.

Further, the Fox River and Hudson River experience shows that careful remedy design and implementation can lead to successful remedy completion, defined by attainment of target SWACs or RALs. For example, the Hudson River remediation applied a robust pre-design investigation similar to that proposed for this IR. That investigation allowed for a careful design that applied the RALs of the ROD, but was not as hindered by the targeting uncertainty present in the ROD footprint. During implementation, a detailed certification process tracked performance in achievement of designed cut lines, management of residuals and resuspension, and successful backfill and cap placement, providing quantitative metrics that ensured the design was being implemented as envisioned. The certification process also allowed for adaptations of the implementation to aid in meeting performance standards. The success of this type of approach on the Hudson River and other sites provides strong evidence that remedy completion is attainable without arbitrary conservatism.

Evaluations of the FS metrics and those subsequently presented to CSTAG/NRRB by CPG demonstrate that Alternative 2 is an appropriate choice for this source control Interim Remedy in that the additional area targeted under the larger alternatives have limited ability to effect additional source control beyond that offered by Alternative 2.

The CPG appreciates the opportunity afforded by USEPA to participate in the CSTAG/NRRB stakeholder session. The CPG looks forward to working with USEPA and the NJDEP to complete

the IR FS and continue the process of addressing the upper 9 miles using an adaptive management strategy to accelerate the clean-up and recovery of the entire Lower Passaic River.

The CPG requests that this letter be included in the Administrative Record for the 17-mile LPRSA operable unit of the Diamond Alkali Superfund Site.

Please contact me with any questions or comments.

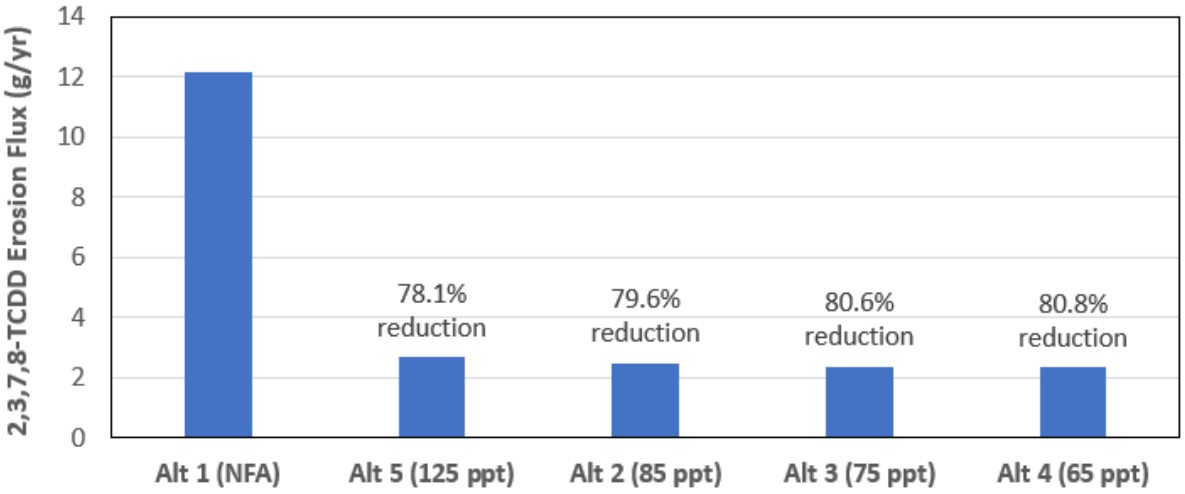
Very Truly Yours,
de maximis, inc.

Robert Law, Ph.D.
CPG Project Coordinator

cc: Karl Gustavson, USEPA
Christine Poore, USEPA
Frances Zizila, USEPA
Jay Nickerson, NJDEP
LPRSA Cooperating Parties Group
CPG Coordinating Counsel

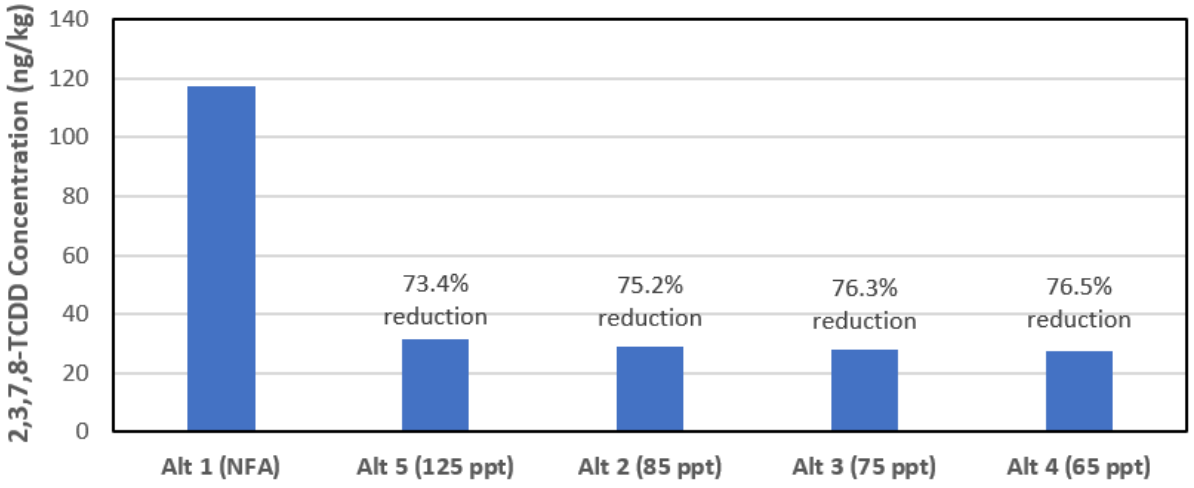
Attachments

a)



Note: Based on total flux over the 10-year post-remedy period in the base FS model projections.

b)



Note: The concentration on depositing fine (cohesive) particles was computed as the ratio of the total chemical deposition flux to the total fine sediment deposition flux over the 10-year post remedy period.

Filepath: \\boston1\Jobs\Passaic_CPG\DOCUMENTS\2019\CSTAG_NRRB_meeting\figures\native\Figure 3_ErosionAndDepo.docx

Figure 3
Post-Remedy 2,3,7,8-TCDD Erosion Flux from RM 8.3 to RM 15 Sediments and Average 2,3,7,8-TCDD Concentration on Depositing Fine Sediments in RM 8.3 to 15

Cooperating Parties Group NRRB/CSTAG Statement
Lower Passaic River Study Area

Table 3-2. Key LPRSA Uncertainties in PRG Development

Input	Discussion of Uncertainty
CFT model projections of sediment and water column concentrations	CFT projections are used in the FWM to establish sediment PRGs for fish consumption and project time for attainment of PRGs/RGs. CFT projection uncertainty informs a range of PRGs and recovery time frames. Refinement of the CFT model will support better estimates.
Tissue, sediment, and water column COC concentrations	Additional data collection (current conditions and post IR sampling) will provide an opportunity to better characterize the complex relationships between COC concentrations in sediment, water, and tissue.
Fish movement	Fish movement varies across species and within a population and as well as seasonally and with migratory behavior. Characterization of fish movement (e.g., fish tagging studies) supports refinement of the FWM with better input on exposure.
Benthic and water column COC exposure	The FWM calibration relies on the relative importance of exposure of biota to four carbon sources (water column particulate organic matter, near-bottom water column particulate organic matter, recently deposited particulate organic matter, shallow bedded sediment particulate organic matter); additional data collection could better characterize relative exposure.
Sediment exposure depth	As directed by EPA, the bioaccumulation model currently uses the 0–15-cm sediment concentrations from the CFT model, but available information suggests that most organisms are primarily exposed to a thinner surface layer (e.g., 0–2 cm). This assumption is not part of the calibration, but the use of the 0–15-cm sediment concentrations influences the calibrated values for other key parameters (e.g., E_D and K_M). LPRSA-specific data could be collected to reduce uncertainty.
FWM parameters that could be refined with additional data collection (e.g., growth rates, lipid content, and COC partitioning to algae)	Additional site-specific data collection of these parameters would reduce uncertainty and/or reliance on literature values.
FWM parameters that could be refined with refined model calibration (e.g., octanol–water partition coefficient [K_{OW}], dietary chemical transfer efficiency [E_D], metabolic rates [K_M])	These parameters are derived from the literature and are key parameters in model calibration. The updated empirical tissue data set and corresponding CFT model inputs will help increase certainty in calibrated values.

Notes:
CFT = contaminant fate and transport
COC = contaminant of concern
EPA = U.S. Environmental Protection Agency
FWM = food web model
IR = interim remedy
LPRSA = Lower Passaic River Study Area
PRG = preliminary remediation goal